

ANP1105V

ANATOMY & PHYSIOLOGY I: Basic Cellular Physiology & the Anatomy and Physiology of the Cardiovascular, Lymphatic & Respiratory Systems September - December, 2023

Updated

Course Description

This is the first of three ANP courses offered within the Faculty of Health Sciences. This course provides an introduction to tissue and cell morphology, biochemistry of the cell and physiological concepts including diffusion, osmosis, membrane transport and homeostasis. The physiology of nerve and muscle cells will be examined followed by in-depth study of the anatomy and physiology of blood and the cardiovascular, lymphatic and respiratory systems. This is a 3-credit course, with 3 hours of on-line lectures per week during the Fall 2023 term.

Course Schedule:	TUESDAYS	1:00 PM - 2:30 PM	Virtual
	THURSDAYS	11:30 AM - 1:00 PM	Virtual

There will be no live, synchronous online lectures. PowerPoint slides will be posted on their own ahead of time so that students can read ahead and prepare. Lectures based on those PowerPoint slides will be recorded and made available according to the syllabus schedule. Students will be given access to the recorded lecture in plenty of time to go through it during the Tuesday and Thursday scheduled lecture times. Please protect the time in your calendar for ANP1105V. ***Always try to review the lecture slides and/or the relevant pages in the text before viewing the lecture videos. Exams are synchronous and must be written on the scheduled date and time.***

All exam times are based on Ottawa time.

Professors: Dr. Joanne Savory (Course Coordinator)
Joanne.Savory@uottawa.ca

Office hours: I will use some of your scheduled lecture time for synchronous virtual office hours via Brightspace Zoom. More information to follow on the course web site. If necessary and depending on my availability, extra office hour sessions can be added as we approach midterm and final exams.

Website: Go to [university's home page](#); Click on the 'Current Students' link in the top banner menu On the "current Students' page Click on **Brightspace**'. Enter your username and password. Click "Login" and this will bring you to a list of courses for which you have online access. Select ANP1105V to access the course website.

Textbook: Marieb, E. N. & Hoehn, K. (2019). **Human Anatomy & Physiology** 11th Edition packaged with the Mastering A&P access code. Pearson Education Inc.
The same textbook AND Mastering Code can be used for all ANP courses.

You have three options at the [University of Ottawa Bookstore](#), depending on your needs, and you can either pick up in person or have your textbook package sent to you.

1. Modified Mastering A&P Access Code ONLY (no e-text) - \$60
2. Hardcover textbook plus modified Mastering A&P Access Code - \$232.75
3. Modified Mastering A&P Access Code with e-text - \$137.75

*Please note that there is also a fourth option to purchase the loose-leaf version of the textbook when you are on the Mastering A&P web site. **However, you must use a Canadian shipping address for this option.** When deciding what to purchase, please note that you will have the access code and e-text for 2 years.*

The Mastering Course ID for ANP1105V is **savory21528**

The login URL: <https://www.pearsonmylabandmastering.com/northamerica/>

EVALUATION

There will be three exams as well as online assignments throughout the duration of the course, as indicated below.

Regularly scheduled exams will be online, synchronous, closed book and proctored via Zoom.

All deferred exams will be in-person.

Exams will be mixed format i.e., a combination of multiple choice, true/ false, matching, fill-in-the-blanks and short answer questions and diagrams to be labelled. See below details the topics to be tested on each exam. I do not deviate from the syllabus so please consult the course syllabus if you are unsure of the topics that will be tested on a given exam.

Your grade will be based entirely on the exams (3), the Mastering A&P (9) and Brightspace (2) assignments. It's not possible to obtain extra credit from additional assignments and/or exams. However, supplemental exams are offered for students who obtain an overall grade of E (see details below). **The distribution of marks is final**, and it is not possible to change the weight of the exams or assignments, in other words, your final grade for the course will be calculated using the weighting described below.

EXAM	Topics to be Evaluated	DATE	Weighting
Midterm 1	<ul style="list-style-type: none">• Structural Organization of the Human Body• Cellular Physiology of Nerve & Muscle	Tuesday, Oct. 3 rd (1:00 – 2:15 PM)	25
Midterm 2	<ul style="list-style-type: none">• Homeostasis, Blood, The Heart	Thursday, Nov. 16 th (11:30 – 12:45 PM)	25
Brightspace Assignments		Throughout the semester	2
Mastering A&P		Throughout the semester	8
Final Exam	<ul style="list-style-type: none">• Blood Vessels & Hemodynamics• The Lymphatic System• The Respiratory System <p><i>Note: 10-15% of the questions will be based on content evaluated on the 2 midterms</i></p>	(Dec 8– Dec 21)	40
Total			100%

EXAMS

All regularly scheduled exams will be online in Brightspace during the regularly scheduled class time. Exams will be closed book and proctored via Zoom. While the lecture videos can be viewed at any time, exams must be written on the date and at the times specified above. Exams times are based on Ottawa time (ET) so if you are living in a different time zone, please take note.

If you have to miss any exam due to illness, you must notify me by email before the exam begins. You must also fill out the online Declaration of Absence form within 5 working days of the examination date. Students can request a maximum of one deferred evaluation (exam or assignment) per course.

. If you don't write the regular exam or deferred exams, you will obtain a zero for that section of the course. You should familiarize yourself with the [University's academic regulations](#).

Please note that ALL deferred exams for this course will be in-person.

- Midterm 1 deferred exam will only be held on Tuesday, October 24, 2023 @ 9:00am in RGN 3248
- Midterm 2 deferred exam will only be held on Friday, November 24, 2023 @ 3:00pm in RGN 3248
- The deferred final exam will take place on – Wednesday, February 21, 2024 – 9:00am in RGN 2005

Supplemental exams: Supplemental Exams are now available for those students who fail an ANP course but do well enough to obtain an E (40 – 49%). ***Students who fail with an F are not eligible for a supplemental exam and must repeat the course.*** The supplemental exam score will replace the original final exam score in the new

calculation of the student's final grade. While both final grades will appear on the student's transcript, only the supplemental mark will be used for grade point calculations.

If you are eligible to write the supplemental exam you will receive an email informing you of your eligibility. If you'd like to write the exam, there is no registration, simply confirm your intent to write via email and show up at the time and place detailed below. You will eventually have to pay supplemental examination fees.

- **The supplemental final exam will take place on** Wednesday, February 21, 2024 @ 1:00pm in RGN 2005

ASSIGNMENTS

10% of your grade will be from online assignments on the [Mastering A&P](#) website throughout the term (see below for Mastering A&P schedule) and three Brightspace assignments (see schedule below). You do not need an access code to complete the assignments in Brightspace, but you must have an access code to be able to do the assignments on the Mastering A&P website.

The due dates for assignments are final and no extensions will be granted so please pay careful attention to the deadline. The excuse of having forgotten the due date will not be accepted. You have an entire week in which to complete assignments that require less than an hour.

Brightspace Assignments	Available (always 6 PM)	Due Date (always 10 PM)
[1] Pre course Self-Assessment	Thursday, September 7 th	Friday, September 15 th
[2] Post Midterm 1 Self-Assessment	Friday, October 6 th	Friday, October 13 th

Mastering A&P Assignments	Available (always 6 PM)	Due Date (always 10 PM)
[1] Cells and Tissues	Thursday, Sept. 14 th	Wednesday, Sept. 20 th
[2] Membrane Transport & Neurons	Thursday, Sept. 21 st	Wednesday, Sept. 27 th
[3] Muscle	Thursday, Sept. 28 th	Monday, Oct. 2 nd
[4] Homeostasis	Tuesday, Oct 10 th	Monday, Oct. 16 th
[5] Blood	Tuesday, Oct. 17 th	Monday, Oct 30 th
[6] The Heart	Thursday, Nov. 2 nd	Wednesday, Nov. 8 th
[7] Blood Vessels & Hemodynamics	Thursday, Nov. 16 th	Wednesday, Nov. 22 nd
[8] Lymphatic System & Respiratory Anatomy	Thursday, Nov. 23 rd	Wednesday, Nov. 29 th
[9] Respiratory Physiology	Thursday, Nov. 30 th	Wednesday, Dec. 6 th

All due dates are final. For the Mastering A&P assignments **there is a penalty is 2% for each hour late**. All assignments are available as study aids until the end of the final exam period.

Note that there is also an introductory Mastering A&P assignment that is available to everyone but really needs to be done only by those new to Mastering. It **does not** count toward your final Mastering score but is a nice introduction to the course and the type of questions you will encounter in the online assignments.

The Mastering A&P assignments are only designed to reinforce the lecture content. The level of difficult of the questions in the assignments is NOT reflective of the level of difficulty of exam questions.

OTHER IMPORTANT INFORMATION

Please examine key [deadlines](#) and the [Faculty of Health Sciences](#) regulations on minimum grades required. The Student Academic Success Service (SASS) website (<https://sass.uottawa.ca/en>) is a great resource when looking for all the services available to students.

Academic Integrity

Each student in this course is expected to abide by the academic regulations of the University of Ottawa. Any work submitted by a student for academic credit must be the student's own work. You are encouraged to study together and to discuss information and concepts covered in lecture with other students. However, during examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during examinations may result in failure of the exam and may lead to failure of the course and University disciplinary action. Please carefully examine regulations on [academic fraud](#). The use of notes of any kind, textbooks, cell phones, laptops, or any other digital equipment is not permitted during exams

SPECIFIC LEARNING OBJECTIVES

1. **Structural Organization of the Human Body**

- 1.1. Define anatomy and physiology and describe their subdivisions
 - 1.1.1 Explain the principle of complementarity
- 1.2. Describe the levels of structural organization that make up the human body
 - 1.2.1 Define: atom, molecule, organelle, cell, tissue, organ, and organ system; give an example of each & localize each in the hierarchy of anatomical structure
- 1.3. Cells: summarize the major organelles and structures found in body cells
- 1.4. Tissues: describe the different tissues of the human body
 - 1.4.1 Define tissue and demonstrate how the organization of cells into tissues contributes to overall homeostasis
 - 1.4.2 List the 4 primary types of tissues
 - 1.4.3 Define epithelial tissue; list 6 functions associated with epithelia

Assignment #1 (Cells and Tissues) is due Wednesday, September 20th

2. **Cellular Physiology of Nerve and Muscle**

- 2.1. Membrane Transport:
 - 2.1.1. Describe the structure of the plasma membrane
 - 2.1.2. Describe and differentiate among the various types of transport across the plasma membrane
 - 2.1.3. Describe osmosis and explain its role in fluid homeostasis
- 2.2. Neurons:
 - 2.2.1. Identify the different regions of the neuron and associate each region with the functions of reception, propagation and transmission of nerve impulses
 - 2.2.2. Explain the phenomena (diffusion of ions, types of ion channels) that are responsible for the electrical activity of neurons (resting membrane potential and action potential)
 - 2.2.3. Describe the factors that influence propagation of the action potential along an axon
 - 2.2.4. Explain the mechanisms of synaptic transmission (synapse, post-synaptic potentials, synaptic integration)

Assignment #2 (Membrane Transport & Neuron) is due Wednesday, September 27th

- 2.3. Muscles:
 - 2.3.1. Describe the microscopic structure of skeletal muscle fibers and explain the cellular mechanisms of excitation-contraction coupling
 - 2.3.2. Describe the neuromuscular junction
 - 2.3.3. Describe the contractile properties of skeletal muscle (motor unit, isotonic & isometric contractions, spatial & temporal summation, etc.)

- 2.3.4. Associate various muscle types with their metabolism and their speed of contraction and rate of fatigue
- 2.3.5. Compare the properties of smooth muscle with those of skeletal muscle

Assignment #3 (Muscle) is due Monday, Oct 2nd

3. Homeostasis: Introduction to the Autonomic Nervous System and Endocrine System

- 3.1. Define and identify the main characteristics of homeostasis
- 3.2. Nervous system:
 - 3.2.1. Compare somatic and autonomic nervous systems
 - 3.2.2. Compare the functional differences between the sympathetic and parasympathetic divisions of the ANS
- 3.3. Endocrine system:
 - 3.3.1. Distinguish between exocrine and endocrine glands, and localize the major endocrine glands
 - 3.3.2. Describe the different structural classes of hormones and their mechanisms of action
 - 3.3.3. Describe the functional organization of the hypothalamic-pituitary axis

Assignment #4 (Homeostasis) is due Monday, October 16th

4. Cardiovascular System

4.1. Blood:

- 4.1.1. Describe the composition of blood (plasma & formed elements)
- 4.1.2. Erythrocytes:
 - 4.1.2.1. Describe the structure and function of RBCs; structure and properties of hemoglobin
 - 4.1.2.2. Describe erythropoiesis, mechanisms of control, and life cycle of erythrocytes
- 4.1.3. Hemostasis:
 - 4.1.3.1. Explain the principal steps and justify the role of platelets and clotting factors in this process
 - 4.1.3.2. Explain the fibrinolytic system and recognize the action of the major anticoagulants
- 4.1.4. Differentiate among the various blood types and explain the basis of transfusion reactions

Assignment #5 (Blood) is due Monday, October 30th

4.2. The Heart:

- 4.2.1. Describe the internal and external anatomy of the heart
- 4.2.2. Trace the pathway followed by blood in both the pulmonary and systemic circuits
- 4.2.3. Describe the organization of the coronary circulation
- 4.2.4. Compare the physiological properties of cardiac muscle cells with those of skeletal muscle cells
- 4.2.5. Compare the electrical properties of contractile cardiac muscle cells with those of auto rhythmic cardiac muscle cells
- 4.2.6. Explain how the intrinsic conduction system of the heart allows it to function as a pump.
- 4.2.7. Explain what is an ECG tracing and the nature of the information it is providing
- 4.2.8. Explain the events occurring during each phase of the cardiac cycle
- 4.2.9. Define cardiac output in terms of heart rate and stroke volume
- 4.2.10. Describe in detail the mechanisms for the regulation of heart rate & stroke volume

Assignment #6 (The Heart) is due Wednesday, Nov. 8th

4.3. Blood vessels and hemodynamics:

- 4.3.1. Compare and contrast the structure of the walls of arteries, capillaries and veins
- 4.3.2. Compare the 3 types of arterial vessels
- 4.3.3. Define microcirculation and compare the three types of capillaries
- 4.3.4. Describe the structure and functions of the venules and veins
- 4.3.5. Define blood flow, blood pressure, resistance, peripheral resistance
- 4.3.6. Illustrate the changes in blood pressure throughout the various vessels of the circulatory system
- 4.3.7. Explain the factors that affect resistance and justify the importance of arterioles in the control of peripheral resistance
- 4.3.8. Define systolic and diastolic arterial pressure, pulse pressure and mean arterial pressure

- 4.3.9. Identify and justify the value for mean capillary blood pressure
- 4.3.10. Express blood pressure in terms of cardiac output and peripheral resistance
- 4.3.11. Describe the short-term neural and chemical mechanisms for the regulation of blood pressure
- 4.3.12. Describe the role of the kidneys in the long-term regulation of blood pressure
- 4.3.13. Define and explain the mechanisms of autoregulation with regard to local blood flow
- 4.3.14. Explain the forces that act to influence capillary exchange
- 4.3.15. Identify the principal arteries and veins of the cardiovascular system: *You will be responsible for arteries and vein up to the level of the wrist and ankle, to each organ and to the brain (to and including the circle of Willis). If you begin early and review often, then you will find it is not as daunting as it looks. However, there will be little "learning time" during the lectures, so it will be up to you to put in the time.*

Assignment #7 (Blood Vessels) is due Wednesday, Nov. 22nd

5. The Lymphatic System

- 5.1. Describe the structure and main functions of the vessels and organs of the lymphatic system
- 5.2. Explain the origin of lymph as well as its transport

6. The Respiratory System (Dr. Savory)

- 6.1. Describe the structures of each one of the components of the conduction and respiratory zones
- 6.2. Describe the gross structure of the lungs & the pleural coverings

Assignment #8 (Lymphatic System & Respiratory Anatomy) is due Wednesday, Nov. 29th

- 6.3. Define & explain the following: intrapulmonary, intrapleural & trans pleural pressures.
- 6.4. Explain the roles of the diaphragm & accessory muscles during inspiration & expiration (quiet & forced)
- 6.5. Explain the 3 factors that influence pulmonary ventilation
- 6.6. Describe how lung volumes & capacities are measured; indicate their physiological significance
- 6.7. Define dead space and indicated its importance in minute and alveolar ventilation
- 6.8. Explain the mechanisms underlying the non-respiratory air movements
- 6.9. State Dalton's Law and use it to describe the composition of atmospheric and alveolar air
- 6.10. Explain the factors that influence the movement of gases at the air-liquid interface
- 6.11. List and describe 3 factors that influence the exchange of air and carbon dioxide (lungs)
- 6.12. Describe the partial pressure gradients that drive oxygen and carbon dioxide movement (tissues)
- 6.13. Describe completely the transport of oxygen in the blood
- 6.14. Explain the sigmoidal nature of the oxygen-hemoglobin dissociation curve
- 6.15. Describe completely the 3 ways in which carbon dioxide is transported in the blood
- 6.16. Explain the Bohr and Haldane effects
- 6.17. Associate carbon dioxide levels with blood pH; explain how respiration can regulate blood pH
- 6.18. Describe how respiration is controlled by the nervous system
- 6.19. Indicate the effects of the following factors on respiration: Hering Breuer reflex, hypothalamus, cortex
- 6.20. List the 3 principal chemical factors that influence respiration and explain their mechanisms of action
- 6.21. Discuss the mechanisms controlling respiration during intense exercise

Assignment #9 (Respiratory Physiology) is due Thursday, December 6th